which is a robust, purely mechanical device. The big advantage is, that there are no motors or electronic which could fail since they are difficult to replace within a hot cell.

A metal rod, which can be advanced or withdrawn by means of a handwheel outside the hot cell, is used to lock the sample storage rack. The winding mechanism is protected by a padlock and Euratom copper/brass seal when not in use.

9. Conclusion

Witnessing of sample taking and the authentication of the samples in large plutonium processing plants up to the analysis is one of the most challenging tasks of a safeguards inspector. Only a combination of different measures can satisfy the Safeguards Authority that the link between the bulk and the sample is maintained and the integrity of the sample guaranteed.

Strategies used by inspectors to guarantee this include: verification and regular re-verification of the plant design; sealing of automatic sampling stations, monitoring of sample flight times; fabrication of plant specific, self-sealing sample bottles; and sealed sample safes and sample racks.

10. References

/1/ P. DE BIÈVRE, R. LESSER, L. KOCH, G. GUZZI, F. MOUSTY, H.G. WAGNER, L. DISIVISCOUR, G. ROBERT "The European Commission's Safeguards Analytical Measurement (ECSAM) Laboratory Network", Proc. 13th Ann. ESARDA Symp. Safeguards Nucl. Mat. Man., Avignon, 1991

/2/ O. CROMBOOM "Implementation of Quality Control for DCS analysis" - Internal Communication European Commission Joint Research Centre, Institute for Transuranium Elements, 1996

/3/ S. DERON, E. KUHN, C. PIETRI, T. ADACHI, S.G. DE ALMEIDA, P. DOUTRELIGNE, S. GUARDINI, P. DE BIÈVRE, K. IWAMOTO, R. SCHOTT, H. WAGNER, R. WEH "1993 International Target Values for Uncertainty Components in Fissile Isotope and Element Accountancy for the Effective Safeguarding of Nuclear Materials", ESARDA Bulletin No. 23, 1994

/4/ F. FRANSSEN, A.B.M.N. ISLAM, C. SONNIER, J.L. SCHOENEMAN, M. BAUMAN "Maintaining Continuity of Knowledge on Safeguards Samples", Proc. 33rd Annual Meeting Inst. Nucl. Mat. Man., Orlando, Florida, 1992

/5/ M.J. BAUMANN "Individual sample vial containment", POTAS Task report E. 78, 1994

Estimation of Sampling Uncertainties: Implications for Regulation of Contaminated Land

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Methods have recently been devised for the estimation of measurement uncertainties due to field sampling. These methods have revealed very large discrepancies between the estimated levels of lead in one area of contaminated land. The precision when sampled by different organisations using the same protocol was +/- 55% (95% confidence). This uncertainty is due entirely to the sampling, rather than the analytical measurement /1/. When sampling organisations used whatever sampling protocol that they considered appropriate, and analysed their own samples, the inter-organisational precision was +/- 72% /2/.

The existing criteria for the classification of contaminated land in the UK depend on the use of threshold trigger concentrations. With such large values of measurement uncertainty in the estimated concentration of the contaminant due to field sampling, there is a large probability of the erroneous mis-classification of land. This has legal, financial and possible health implications from both the unnecessary remediation of 'uncontaminated' land and the erroneous acceptance as uncontaminated of land that is in fact contaminated.

Further studies of a variety of contaminated sites with a range of contaminants are required to clarify the typical contributions to the measurement uncertainty of both the sampling and analytical procedures.

New classification criteria for contaminated land are required that allow for not just the estimated concentration of the contaminant, but also the overall measurement uncertainty in its estimation.

References

/1/ RAMSEY M.H., ARGYRAKI A., THOMPSON M. (1995) "On the Collaborative trial in Sampling", Analyst, 120, 2309-2317

/2/ ARGYRAKI A., RAMSEY M.H., THOMPSON M. (1995) "Proficiency testing in Sampling: Pilot study on Contaminated Land", Analyst, 120, 2799-2804.